



MARSHALL STAR

Serving the Marshall Space Flight Center Community

Oct. 30, 2003

Most powerful Space Shuttle Solid Rocket Motor ever tested pushed to edge, still performs flawlessly

by Lynnette Madison

The most powerful Space Shuttle Reusable Solid Rocket Motor ever tested pushed beyond typical launch performance boundaries at a Utah test facility Oct. 23.

The five-segment test motor, which ran for 128 seconds and generated more than 3.6 million pounds of thrust, appeared to perform flawlessly, in line with preliminary data, according to Jody Singer, manager of the Space Shuttle Reusable Solid Rocket Motor Project Office at the Marshall Center. Final results from the test are not immediately available.

“It was a great success. We are

*See **Motor** on page 2*



ATK Thiokol photo

Smoke fills the Utah sky during last week's rocket motor test.

Cosmic X-ray flashes reveal their distance

from the Smithsonian's Chandra X-ray Center

Astronomers using X-ray, radio, and optical telescopes have announced a big leap in solving the origin of mysterious objects known as X-ray flashes (XRFs) by finding that they originate from blue star forming galaxies.

This discovery of the cosmic distant scale effectively ends widely held speculation that XRFs are the death-cries from stars exploding in infant universe.

X-ray Flashes resemble a lower energy and longer-duration version of a gamma-ray burst, an energetic explosion thought to signal the death of a massive star. The properties of XRFs led to speculation that they were gamma-ray bursts that occurred less than a few billion years after the Big Bang, and whose light had been subsequently weakened and time-stretched by the expan-

*See **Chandra** on page 3*

Skylab astronauts to visit Marshall for 30th anniversary events

from the Government and Community Relations Department

Eight of the nine astronauts who flew aboard Skylab will meet with Marshall team members Nov. 10 at 12:45 p.m. in Morris Auditorium as part of the 30th anniversary celebration of America's first space station.

The astronauts also will commemorate Skylab's three historic missions during the following events in Huntsville on Nov. 10:

- Education outreach sessions with the astronauts in area schools including Huntsville City Schools, Madison County and Madison City Schools via distance learning facilities, and to schools statewide by Web cast.

- The 2003 Von Braun Forum, beginning at 2 p.m. in the Chan Auditorium in the Administrative Science Building on the campus of the University of Alabama in Huntsville. This year's forum will

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Motor

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believers in the 'test before you fly – fly it on the ground first' program," Singer said. "We look forward to getting the data because we want to make sure we understand all aspects of the safety and reliability of the Shuttle's motor."

The full-scale static — or stationary — test was performed at ATK Thiokol Propulsion Division, an Alliant Techsystems Inc., company in Promontory, Utah, north of Salt Lake City. ATK Thiokol manufactures the Shuttle's Solid Rocket Motor.

An engineering test motor is used to simulate the conditions experienced in flight. It offers engineers an opportunity to better assess the strength of the motor's current design, to spot any flaws in the new designs, to verify new materials and to certify manufacturing processes.

Engineers placed more than 630 data-gathering instruments at strategic points on the test motor — about one-third more collection points than on a four segment motor. This test motor — the third in a series of four to be tested — ran five seconds longer than the motors fire when launching the Space Shuttle, produced 300,000 pounds of thrust over the motor's maximum limit of 3.3 million pounds, and included an additional fifth motor segment adding 25 percent more propellant. Of the test motor's total weight of 1.56 million pounds, propellant accounts for 1.37 million pounds.

The test demonstrates additional performance capabilities, or risk margins, on the Reusable Solid Rocket Motor,

according to Singer. "This was a true margin test for the solid rocket motor," Singer said. "Demonstrating capabilities, or margins, above the existing flight design limitations, allows us to learn more about how our current design performs. This particular test motor, with five segments, was designed to expand the performance envelope above the four-segment Reusable Solid Rocket Motor that is currently used to launch the Space Shuttle.

"The five-segment solid rocket motor was originally proposed as a performance enhancement to reduce or eliminate potential abort scenarios; however, it was determined to provide benefits by expanding our knowledge of our operating environment and performance capabilities, as well as enhancing our critical skills," Singer continued. "The design of Engineering Test Motor-3 provided a much needed opportunity for government and contractor engineers, both veteran and new, to work through design process to develop a new solid rocket motor variant."

There are currently no plans to introduce the five-segment solid rocket motor into the Space Shuttle fleet in the foreseeable future.

"Adding 300,000 pounds of thrust can make a big difference in how the motor's nozzle and thrust vector control system -- used to guide the Shuttle - works," Singer said. "This test increases our understanding of motor component design capabilities and the processes and materials used to build those elements by extending our operational envelop."

The test also provides an opportunity for the project to determine if its computer analytical models are effective, Singer said. Analytical models generate solutions that predict how a system will perform based on a given set of circumstances or conditions. These models are used to test and certify new designs, to forecast difficulties with existing motors, and to gather information to predict any problems that might occur before or during a Space Shuttle launch.

There were 67 test objectives, including testing the aft motor insulation and nozzle liners, gathering information on the pressure in the field joints, and improving the capability to better predict the rate at which the propellant burns.

Following the test, the data will be analyzed and the results for each objective provided in a final report.

At 126 feet long and 12 feet in diameter, the Shuttle's Reusable Solid Rocket Motor is the largest solid rocket motor ever flown, and the first designed for reuse. During its approximately 123 seconds burn at liftoff, each motor generates an average thrust of 2.6 million pounds. The five-segment motor tested is 27.5 feet longer than a four-segment motor.

The Marshall Center requires full-scale tests such as this before new materials or processes are included in motors flown on the Space Shuttle.

The writer, an employee of ASRI, supports the Media Relations Department.

Skylab

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consist of a special 30th anniversary Skylab video and panel discussions addressing the science performed aboard Skylab, the rescue of Skylab, and the world records set during the three missions. The event is open to the public and admission is free.

- At the conclusion of the Von Braun Forum, a special Skylab collection will be formally opened in the lobby of the UAH Salmon Library adjacent to the Administrative Science Building at 4 p.m.

- The astronauts also will participate in a 30th anniversary

Skylab video and panel discussion in the IMAX Theater of the U.S. Space & Rocket Center at 5:30 p.m., followed by a reception in the museum at 7 p.m. The Space & Rocket Center events are open to the public and cost is \$20 for the reception and \$40 for the reception and IMAX Theater event.

Reservations to the evening events may be made online at www.hsvchamber.org, by calling 1-256-535-2031, by e-mail at tleopold@hsvchamber.org, or by mail to the Chamber of Commerce, Attn: Government Affairs, P.O. Box 408, Huntsville, AL. 35804.

Marshall Center's Frank D. Mayhall selected for Senior Executive Service

from the Human Resources Department

Franks D. Mayhall, a long-time employee of the Marshall Center, has been appointed to the federal government's Senior Executive Service — the personnel system that covers most of the top managerial, supervisory and policy positions in the executive branch of the federal government.

Mayhall, deputy chief financial officer in the Office of the Chief Financial Officer, came to the Marshall Center's Financial Management Office in 1974 as an auditor. Two years later he accepted an assignment as an auditor with NASA's Inspector General in Washington, D.C., to serve in a two-year rotational position at the Kennedy Space Center in Florida. He also led and conducted audits at NASA's Michoud Assembly Facility in New Orleans, La., and at the Stennis Space Center,



Mayhall

Miss. From 1982 to 1984, he represented the NASA Office of Inspector General as the senior liaison official with the Defense Contract Audit Agency over a five-state region.

He returned to the Marshall Center in 1984, where he served in a number of managerial roles and became deputy chief financial officer for finance in 1991. He was named acting deputy chief financial officer for resources in 1999.

As the deputy chief financial officer for the Marshall Center, Mayhall is responsible, with the chief financial officer, for formulating and executing an annual budget of more than \$2 billion.

Mayhall is a recipient of NASA's Exceptional Service Medal, and a member of the American Institute of Certified Public Accountants, the Alabama Society of Certified Public Accountants and the Association of Government Accountants.

Chandra

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sion of the universe.

"Now that the very distant origin has been ruled out, X-ray flashes could be due to exploding massive stars, just like gamma-ray bursts, but the explosion from an X-ray flash would need to contain less matter or less energy than a typical gamma-ray burst. Alternatively, X-ray flashes could be gamma-ray bursts viewed off-axis," said Dr. Joshua Bloom at the Harvard-Smithsonian Center for Astrophysics in Cambridge, Mass. Bloom is the lead author on a paper announcing the results to be published in *The Astrophysical Journal*.

The location of the sources studied by Bloom's group required a careful coordination of NASA's Chandra X-ray Observatory and Hubble Space Telescope, along with the National Radio Astronomy Observatory's Very Large Array (VLA) in Socorro, N.M. Chandra and the VLA provided a precise location of the fading X-ray and radio "afterglow" of two X-ray flashes known as XRF 011030 and XRF 020427. Hubble was used to identify and study galaxies at these locations and estimate their distances to between about 6 to 11 billion light years from Earth.

X-ray flashes were discovered by John Heise, of the Space Research Organization in the Netherlands, and colleagues in 2001, using the Dutch-Italian X-ray

satellite BeppoSAX.

Bloom added the perspective that, "Nearly thirty years of active research was required to discover the distance scale to gamma-ray bursts, but the distance scale mystery was solved in only two years for X-ray flashes."

The universe is particularly rich in objects that exhibit bursts at X-ray wavelengths. Bursts of X-rays are routinely detected from the Sun, from magnetically active stars, from neutron stars and black hole systems in the Milky Way, and from active supermassive black holes near the centers of distant galaxies.

"What sets X-ray flashes apart from all the other X-ray transients out there are their characteristic duration and spectrum," said Dr. Derek Fox at the California Institute of Technology, a co-

author on the paper.

X-ray flashes are relatively rare compared to other bursting sources — with a rate of about one per day in the universe. Each flash comes without warning from a seemingly random position on the sky and lasts for tens to hundreds of seconds.

An examination of galaxies that hosted the X-ray flashes hints at a stellar origin for the explosions.



Marshall Imaging Services

'Engineering' a more beautiful garden

Members of the Marshall Center's Engineering Systems Department plant shrubs, flowers and pull weeds at the Huntsville-Madison County Botanical Gardens last week during Community Service Days for the Combined Federal Campaign. From left, are Dan Mellen, Wanda Siddall, George Hamilton, Charlie Dischinger and Sara Kent. The Marshall Center's CFC goal is \$500,000 during the six-week campaign. With about two weeks to go, Marshall contributions total just under \$400,000.



Photo by Emmett Given, NASA/Marshall Center

Talking about space

Participants in the 8th Spacecraft Charging Technology Conference chat during a reception last week at the U.S. Space & Rocket Center in Huntsville. Astronaut Franklin Chang-Diaz, right, who is director of the Advanced Propulsion Laboratory at Johnson Space Center in Houston, was the keynote speaker during the conference. With him, are, from left, David Cooke of the Air Force Research Lab at HANSCOM Air Force Base near Boston; Veronika Ekstrand of Konsberg Satellite Service in Norway; and Steve Pearson, chief technologist for the Marshall Center's Engineering Directorate. The conference was a collaboration between NASA's Space Environments and Effects Program, the Air Force Research Lab and the European Space Agency to highlight work to mitigate effects of spacecraft charging on satellites and space vehicles. The conference is held once every three years.

Job Announcements

MS04D0028, AST, Liquid Propulsion Systems. GS-0861-11, 12, Space Transportation Directorate, Vehicle & Systems Development Department. Closes Oct. 30. Contact: Jim Bramblett at 544-3398.

MS04C0029, Security Specialist. GS-0080-05, Center Operations Directorate, Protective Services Department. Closes Nov. 4. Contact: Dana Blaine at 544-7514.

MS04C0033, Management Support Assistant (OA). GS-0303-07, Office of the Chief Financial Officer. Closes Nov. 7. Contact: Dana Blaine at 544-7514.

MS04C0034, AST, Technical Resource Mgt. GS-0801-14, Engineering Directorate, Avionics Department. Closes Nov. 4. Contact: Allan Day at 544-4079.

MS04D0035, AST, Technical Management. GS-0801-14, Second Generation RLV Program Office, Program Planning and Control Office. Closes Nov. 7. Contact: Patricia Caraway at 544-7755.

Nominees sought for position on Marshall Center Exchange Council

from the Marshall Exchange

Nominations are being accepted to fill one position on the Marshall Center's Exchange Council.

A committee will accept names of nominees when accompanied by a petition signed by 20 or more employees. Employees can make nominations at-large. There is no requirement that nominees and petitioners be from the same organization. Petitions must be signed by the nominee indicating a willingness to serve if elected. Petitioners must provide their Marshall badge number and their own signature with the petition.

Each candidate must have served as a Marshall employee for not less than one year. The term of office is two years. No Marshall employee may serve concurrently as a member of the Exchange Council and as an officer of any Exchange-sponsored club or activity.

Deadline for submitting nominations is close of business, Nov. 14. Petitions

should be mailed to Exchange Council Election, CD10X, Building 4315.

The new Exchange Council member will take office in 2004, and join two other elected members.

The center director appoints four members of the seven-person Exchange Council, including the positions of chairman, operations manager, treasurer, and secretary.

A list of nominees and voting instructions will be printed in the Nov. 20 issue of the Marshall Star.

The Exchange

Council develops an annual budget to support various morale and welfare activities on behalf of Marshall team members.



Photo by David Higginbotham, NASA/Marshall Center

Getting the first flu shot of the season

Marshall team member Peggy Grisby, right, gets the first flu shot of the season in Bldg. 4200 last week from Mary Jones, a nurse at the Marshall Medical Center. Being first in line was lucky for Grisby, as the line of Marshall team members waiting for their vaccine stretched halfway across the Bldg. 4200 courtyard.

Center Announcements

SLTS design and operations workshop is Nov. 17-19

A Space Launch and Transportation Systems Design and Operations workshop will be Nov. 17-19 at the Marshall Center in Bldg. 4200, Room G-13E. The workshop's focus is technical risk identification and mitigation in the most cost-effective manner, while maintaining technical integrity of a vehicle and infrastructure. For more information, see "Inside Marshall."

Big Brothers-Big Sisters event set for Nov. 14-16

The Big Brothers-Big Sisters annual fund-raising campaign this year features "Bowl for Kids Sake" on Nov. 14-16 at Monarch Lanes on Bob Wallace Avenue in Huntsville. For more information, call 880-2123 or go to www.bbb-sna.com or call Teresa A. Foley-Batts at 544-0335.

HEDS course nomination forms due Nov. 24

Nomination forms for the Human Exploration and Development of Space course are due Nov. 24, or as soon as possible, to Georgann Freeman in CD20. The event, to be held Jan. 12-16, will be at Wallops Flight Facility in Virginia. For more information, see "Inside Marshall."

Telephone, data system outage set for Saturday

Marshall offsite locations will experience outages and disruption to telephone equipment including faxes, modems, conference phones, data, video and paging systems from 7-10 a.m. Saturday. Emergency 911 services also will not be functioning from 8 a.m.-10 p.m. Marshall team members are encouraged to have a cell phone with them during this period. For a list of affected buildings, see "Inside Marshall." For more information, call the NASA Information Support Center at 544-HELP, Option 0.

Parsons to speak at Marshall Association meeting Tuesday

NASA's Space Shuttle Program Manager Bill Parsons will speak at the Marshall Association meeting from 11:45 a.m.-12:45 p.m. Tuesday in the Center Activities Bldg. 4316. Cost is \$7 payable at the door. Reservations are required and can be made by calling Cliff Bailey at 544-5482.

Additional CAIB report volumes available

Volumes II-VI of the Columbia Accident Investigation Board report are available on the NASA Web site at www.nasa.gov. These volumes contain appendices and additional information, which provides supporting documentation for the main text of Vol. I of the report. Hard copies of the Volumes I-VI are available through the Government Printing Office and can be ordered at www.gpo.gov.

Ergonomic evaluations and tips available at Web site

Ergonomic evaluations and tips are available at <http://health.msfc.nasa.gov/environ.html> for Marshall team members. The Web site offers tips to make your office ergonomically correct and exercises that you can perform in your office to help keep muscles loose. Team members also can request an ergonomic evaluation online.

IT security training mandatory for Marshall team members

Marshall team members, civil service and contractor, are required to take either "Basic IT Security for 2004" or "IT Security for Managers 2004." To complete the training, go to <https://solar.msfc.nasa.gov/solar/deliver/public/html/newindex.htm>.

Woodcarving show Saturday, Sunday in Huntsville

Marshall team members are invited to a free woodcarving show and sale from 10 a.m.-5 p.m. Saturday-

Sunday at the Railroad Depot Roundhouse in Huntsville. The show is sponsored by the North Alabama Woodcarvers Association. For more information, call Don Perkinson at 881-5897 or 961-7578.

Veterans Day participants needed for Huntsville parade

The Marshall Center will participate in the annual Veterans Day parade in Huntsville on Nov. 11. Marshall team members who want to participate should arrive at 10 a.m. at the empty lot beside the old Coca-Cola plant on Clinton Street in downtown Huntsville. The parade will begin at 10:55 a.m. and will head east on Clinton Street. For more information, call Shelvie Miller a 544-0090.

AIAA Great Paper Airplane Contest set for Nov. 7 at UAH

The American Institute of Aeronautics and Astronautics will host the 10th Annual Great Paper Airplane Contest from 3:30-5:30 p.m. Nov. 7 in the University Center Exhibit Hall at the University of Alabama in Huntsville. There are categories for all age groups and awards will be presented. Participants can enter paper airplanes in the following categories: aerobatics, time of flight, distance, accuracy, and artistic. For more information, call Rose Allen at 544-0117.

Von Braun Astronomical Society to present star program Nov. 15

NASA astronomer Jessica Gaskin will present "The Astronomy Mythos" at 7:30 p.m. Nov. 15 at the Wernher von Braun Planetarium on Monte Sano Mountain in Huntsville. The program is hosted by the Von Braun Astronomical Society and will feature examples of legendary figures in the sky and how cultures from around the world have viewed our universe across the centuries. Cost for non-members is \$3 for adults and \$2 for children 12 and under. If weather permits, a "Star Party" will take place using the society's telescopes. For more information, call Mitzi Adams at 961-7626.

Classified Ads

Miscellaneous

- ★ HP Deskjet 840C color printer, extra black ink cartridge, \$50; Canon Camera bag, \$20. 256-721-0042
- ★ Queen comforter bed set, pale green w/eggshell/pink roses, \$75. 256-498-6580
- ★ Forty 6", and 50 6-1/2", T-posts, \$1 and \$1.50 each. 256-461-8369
- ★ Two steel ramps for auto, lawn tractor, etc., \$10. 256-461-8369
- ★ Levi 540 jeans, men's size 40x30, worn once; men's size 40x34, \$10 each. 880-7490
- ★ Tupperware items. 256-498-2028
- ★ Cannondale, CAAD-4, Dura Ace and Ultegra STI, helium wheels, height approx. 5'11"-6'2", \$800. 721-7799
- ★ Palm Zire handheld, windows & Mac compatible, new in bubble wrap, \$35. 881-8204
- ★ New girl's 15-speed bicycle, MAGNA Glacier Point, purple, \$50. 881-6016
- ★ Sears heavy-duty chipper/shredder, takes 3" limbs, \$375; Cup-of-Christmas-Tea teapot, cup & saucer. 837-6776
- ★ Dining room suite, two piece china cabinet, table, leaf, & eight chairs, \$1,195. 881-2272
- ★ Nordic Track-Pro w/video, can deliver, \$75; SunPak camera flash 1600A, fits multiple SLR's, \$25. 325-6000
- ★ Dept. 56 Snow Village collection; 39 buildings, 39 accessories, retired, \$1,500. 837-0037
- ★ Kitchen drop-leaf round table, 36", two matching chairs, \$40. 828-1441
- ★ Space Shuttle Challenger children's play tent from 1986. Unused, in box. \$75. 306-0700 Decatur
- ★ Dell 200MHz mini-tower w/video, sound, Ethernet, Modem, Windows/Office, \$50; Gateway 15" monitor, \$50. 765-532-4218
- ★ LazyBoy sofa and loveseat, blue cloth, \$450 for both. 655-3065
- ★ VHS video camera, \$50. 256-655-2055
- ★ Browning compound bow, case, graphite arrows, release. Athens/431-1188
- ★ Two tickets, Broadway Theatre League's "Jesus Christ Superstar," Nov. 28, 8 p.m., Loge-2/seats C10/11, \$65. 881-8953
- ★ 1987 Glass Stream 14', 45HP Mariner, w/trim trolling motor, depth/fish finders, \$2,200. 721-0910
- ★ Two tickets, Michael W. Smith, Christmastime, Nashville, Gaylord, seats 217-G/11-12, 12/14/03, \$55. 880-6563
- ★ Lexani Krystal chrome wheels w/tires, 20", 5-lug, \$1,400. 251-769-0813
- ★ White Kenmore electric super-capacity 27" dryer, shoe rack included, \$250. 751-4043
- ★ HP600 Ink Jet color printer, \$50; Huskvarna Viking #1+ sewing/embroidery machine, \$1,250. 837-6109
- ★ Two tickets, "Jesus Christ Superstar", 7th-row, seats G17/G18, Nov. 29, 2 p.m., \$41.50 each. 883-2863
- ★ Computer desk, gray top, \$35; computer chair,

- gray, \$35. 256-851-8738
- ★ Polar A1 heart rate monitor, \$35; Toy kitchen, \$25; Assorted VHS tapes, \$3 each. 256-655-2055
- ★ Antique china cabinet, \$150. 828-6325
- ★ 1977 Avion travel trailer, 27', for hunting, camping or lake lot, \$4,900. 931-427-2059
- ★ Sears resistive band exercise machine w/stepper, \$100. 881-7491
- ★ Stihl Model FS55R straight shaft string trimmer, purchased 9/2/03, \$175. 881-8545
- ★ 1999 Harley Davidson Sportster XL833 hugger, low mileage, many extras., 859-8489
- ★ Oval solid maple table, 60", 2 armchairs, 4 side chairs, 2 extension leaves, \$275. 539-7857
- ★ Dell desktop dimension Pentium2 w/7GB, 192MB Ram, CDRW, Ethernet, Win2000Pro & monitor, \$400. 256-721-0042
- ★ Mossberg 500, rifle barrel, Simons scope, synthetic and wood pump and stock, \$350. 351-0827
- ★ ARE polished snipers, 17", with 225/55 Michelin tires, 4K miles, fits FWD GM, \$750. 830-5783
- ★ Palm V accessories kit, Modem, charger, wireless web, GSM upgrade, carrying case, \$20. 772-8489
- ★ Sofa & loveseat, \$300; antique desk, \$25; full-size bedroom suite, \$150. 233-4580 after 5 p.m.
- ★ Infant car seat, \$20; toddler-to-5 years car seat, \$25. 256-723-4983
- ★ Flex CTS weight bench, weight bands, stepper, \$100. 464-9910
- ★ Yamaha clarinet w/carrying case, plastic model 20, purchased August 2001, \$200. 837-6797
- ★ NEC laser printer, Silent Writer 2, Model 90, works with PC or Mac, \$60. 683-9364
- ★ WW two-horse bumper pull trailer, fully enclosed, \$1,600. 256-685-0308
- ★ New Sony MiniDisc Walkman MP3 player/recorder w/one rewriteable minidisk, \$89. 489-0136
- ★ Entertainment center, 3-piece wall unit, accommo-dates 32" TV, \$300; black metal desk w/chair, \$100. 883-5168
- ★ American Bulldog pups, 5-girls, 3-boys, ready in time for Xmas, \$200. 205-559-3700
- ★ Sofa, 6', matching 5.5' loveseat, sea-green, \$495 set; Loveseat, 68", red/green/gold plaid, \$150. 772-1974
- ★ Two tickets, Huntsville Symphony Orchestra classical performance, Nov. 15, center seats, Row Q, \$42 each. 722-7927
- ★ King-size Renaissance mattress system, air, extra pillow top, \$500. 539-3284
- ★ 2002 Yamaha PSR-GX76 keyboard, two software packs, MIDI cables, stand, adapter, pedal. \$360. 534-3252

Vehicles

- ★ 1998 S-10, automatic, 4-cyl., 45.5K miles, beige, step-side w/bed cover, \$7,500. 256-890-8463
- ★ 2000 Mazda 626, 4-door, 41K miles, silver w/gray interior, PS/PB/PB/PL, AM/FM/CD cassette, a/c, \$9,950. 256-230-0806
- ★ 2001 Hyundai Sante Fe LX, 65K miles, loaded,

- \$12,500. 851-8668
- ★ 1992 Nissan Maxima GXE, white, power door locks, keyless entry, A/C, \$2,500. 721-7799
- ★ 1995 Dodge Caravan SE, automatic, 164K miles, blue exterior, gray interior, V6, \$2,000. 256-880-3337
- ★ 2003 Ford XLT, 5-speed, CD player, bed-liner, 2.2K miles, \$15,000. 882-5687
- ★ 1985 "Honey" motor home, a/c, heat, bathroom, shower, kitchen, stove, refrigerator, more, \$5,990. 881-8674
- ★ 1992 Firebird 305, automatic, green, T-tops, factory CD, 183K miles, one-owner, well maintained, \$4,000. 931-433-8542
- ★ 1996 Mercury Mystique, 125K miles, 4-cyl., auto, 4-door, many options, \$2,175 firm. 256-753-2278
- ★ 1989 S-15 GMC Jimmy, 4.3L, 4WD, black/blue, 231K miles, \$1,450. 837-6517
- ★ 1993 Saturn, 4-door sedan, new tires, low mileage. 882-9361
- ★ 2000 Cadillac Deville, red, leather seats, low mileage, one-owner. 256-539-1564
- ★ 1995 F-150 XLT, 6-cylinder, manual transmission, 112K miles, must sell, \$3,300. 895-2959
- ★ 1999 Ford F250 pickup truck, 7.3, diesel, 149K miles, 5-speed, \$2,750. 230-6819 after 4 p.m.
- ★ 1995 Mazda Protégé LX, one-owner, 115K miles, automatic, PS/PSPW/PL, a/c, cruise, moonroof, sparkle-green, \$2,500. 829-0285
- ★ 1986 Corvette, red on red, 4.3 manual transmission, Z51, 86K miles, \$8,800. 881-8446
- ★ 1991 Explorer XLT, 4-door, leather, 64K miles, new fuel pump, radiator, brakes, a/c. \$5,500. 880-6498
- ★ 1990 Jeep Wrangler, 4x4, 4.2 inline 6, 4" lift, 2001 engine, 20.6K miles, \$8,000. 771-1952
- ★ 2000 Nissan crew-cab, 4-door, auto, PW/PL, 83K miles, silver, remote/security, liner, a/c, \$12,500. 880-9025

Wanted

- ★ Someone to adjust Singer sewing machine thread tension, both needle and bobbin. 881-6040
- ★ Original Nintendo NES console, cheap, must work well; games, controllers not required. 230-2521
- ★ Used Honda XR 100 dirt bike, must be complete, mechanically sound, cosmetics unimportant. 230-2521
- ★ Queen-size waterbed mattress, preferably waveless. 852-4406
- ★ Natural gas wall mount or stand alone heater, 20,000 to 30,000 BTU. 858-3034
- ★ Double jogging stroller in good condition. 883-9278

Free

- ★ Gray Tabby kitten, 3 months old. 881-8674
- ★ Puppies, free to good home, lab mix. 256-335-5896

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